GEFRAN

# GE1029-DU1D

*TIE-BAR STRAIN SENSOR WITH 1- CHANNEL MONITOR DU1D*

## Operating manual

# WEEE Information

**IT**

**“Attuazione della direttiva 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE)”**

Il simbolo del cassonetto barrato riportato sull’apparecchiatura o sulla sua confezione indica che il prodotto alla fine della propria vita utile deve essere raccolto separatamente dagli altri rifiuti.

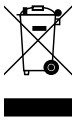
La raccolta differenziata della presente apparecchiatura giunta a fine vita è organizzata e gestita dal produttore.

L’utente che desideri disfarsi dell’apparecchiatura dovrà quindi contattare il produttore per ricevere indicazioni sul sistema da quest’ultimo adottato per consentire la raccolta separata dell’apparecchiatura giunta a fine vita.

L’adeguata raccolta differenziata per l’avvio successivo dell’apparecchiatura dismessa al riciclaggio, al trattamento e allo smaltimento ambientalmente compatibile contribuisce ad evitare possibili effetti negativi sull’ambiente e sulla salute e favorisce il reimpiego e/o riciclo dei materiali di cui è composta l’apparecchiatura.

**EN**

**“Implementation of Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)”**



The symbol showing a crossed-out wheeled bin on equipment or its packaging indicates that the product must be collected separately from other waste at the end of its useful life.

The manufacturer is responsible for organising and managing the separate collection of this piece of equipment at the end of its useful life.

Users wishing to dispose of the equipment must therefore contact the manufacturer to obtain instructions from the same on how to have the equipment collected separately at the end of its useful life.

By collecting the disused equipment separately, it can be recycled, treated or disposed of in an environmentally friendly manner, thus helping to prevent the environment and public health from being affected negatively and enabling reuse and/or recycling of the materials forming the same equipment.

**DE**

**„Umsetzung der Richtlinie 2012/19/EU über Elektro- und Elektronik-Altgeräte (EEA)“**

Das Symbol der durchgekreuzten Mülltonne auf dem Gerät oder der Geräteverpackung weist darauf hin, dass Sie das Produkt am Ende seines Lebenszyklus separat entsorgen müssen.

Die Getrenntsammlung dieses Geräts an seinem Lebenszyklusende wird vom Hersteller organisiert und besorgt.

Der Nutzer, der das Gerät entsorgen möchte, muss sich daher an den Hersteller wenden, um Auskunft über seine Vorgehensweise zur Getrenntsammlung des Geräts an dessen Lebenszyklusende zu erhalten.

Die entsprechende Getrenntsammlung für die anschließende Zuführung des Altgeräts zum Recycling, zur Wiederaufbereitung und zur umweltverträglichen Entsorgung trägt dazu bei, negative Auswirkungen auf die Umwelt und die Gesundheit zu unterbinden und begünstigt die Wiederverwendung und/oder das Recycling von Werkstoffen, aus denen das Gerät besteht.

**FR**

**“Transposition de la Directive 2012/19/UE relative aux déchets d’équipements électriques et électroniques (RAEE)”**

Le pictogramme de la poubelle barrée, figurant sur l’équipement ou sur son emballage, indique que le produit en fin de vie doit être traité séparément des autres déchets.

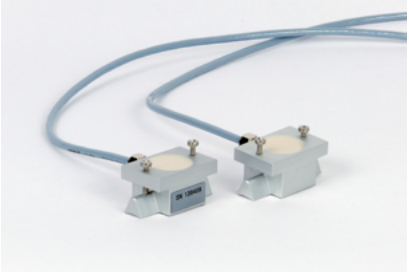
Le ramassage sélectif de cet équipement en fin de vie est organisé et géré par le constructeur.

Tout utilisateur qui souhaiterait se débarrasser de l’équipement devra donc contacter le constructeur pour obtenir des informations concernant la méthode adoptée pour permettre le ramassage sélectif de l’équipement en fin de vie.

Un ramassage sélectif correct, en vue de l’acheminement de l’équipement vers des opérations de recyclage, de traitement et de mise au rebut respectueuses de l’environne-ment, contribue à réduire les impacts poten-tiellement néfastes sur l’environnement et la santé, outre à favoriser la réutilisation des matériaux/composants dont l’équipement est constitué.

# GE1029

TIE-BAR STRAIN SENSOR



## Main features:

- Direct measurement of surface strain
- Quick and easy non-destructive assembly
- High accuracy and linearity in tension and pressure (like bonded strain gauges)
- Ideal for use on presses, injection-moulding and die-casting machines
- One system for many different tie bar diameters (25…400mm)
- Dynamic applications
- Without amplifier (passive)
- Ideal for online monitoring of clamping force
- Ideal for self-made load cells

## Product description

The strain gauge sensor GE1029 measure the surface-strain directly at the mounting location in the same quality as bonded strain gages. The press-on technology, developed by Gefran Schweiz AG, presses the strain gauges under the stainless protective film so strongly against the surface to be measured that frictional contact occurs.

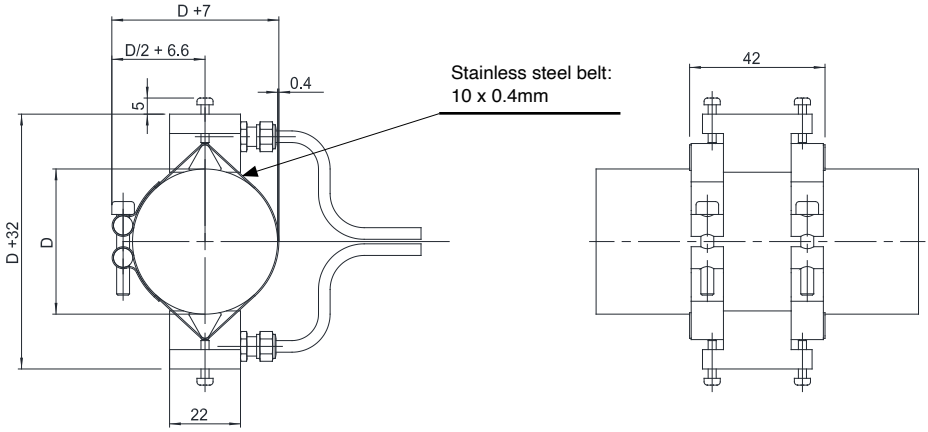
The sensor does not have to be recalibrated between remove and re-installation. The sensor is mounted using stainless steel straps, is non-destructive, very fast and simple. For each tie-bar diameter outside tolerance of ± 2.5mm a different pair of steel straps is required. The sensor can not be overloaded. The GE1029 sensors require a cyclic reset.

## Technical Data

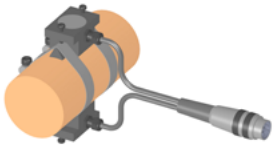
| | |
|---|---|
| Strain gauge type | Foil (GF = 2.0) |
| Bridge resistance | 350Ω |
| Measuring range | ± 1000 με |
| Sensitivity tolerance | ± 0.2% |
| Transverse sensitivity | 0.9 ± 0.2 % |
| Accuracy | <± 0,5% FS |
| Linearity | <± 0,5% FS |
| Hysteresis | <± 0,2% FS |
| Repeatability | < 0,1% FS |
| Supply voltage | 5VDC (max. 8VDC) |
| Supply current | < 15mA |
| Operating temperature range | -20...+70°C |
| Storage temperature range | -20...+70°C |
| Overload capabilitiy | indefinite (offset occurs) |
| Protection class | IP64 |
| Case material | Anodised aluminium |
| Weight, including cable | 200g |

# Dimensions

| Installation requirements | |
|---|---|
| Press-on torque (M4 screws) | **2.0 Nm** |
| Surface installation spot | **N7** |



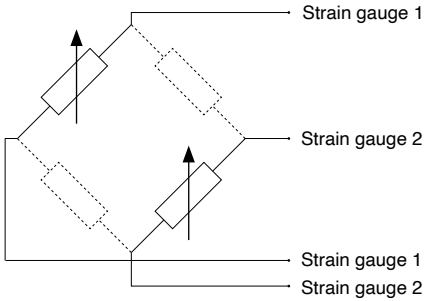

**Application: Self-made load-cell**



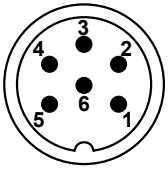
Dimensions in mm

# Electrical Connection

**2/4 Bridge**

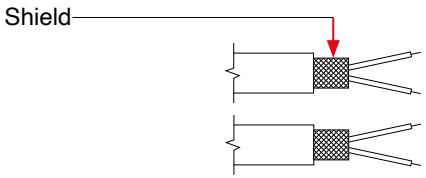



Option C: cable with connector




| Option C Connector Pin | Option O open leads | Function |
|---|---|---|
| 1 | red | Strain gauge1 |
| 2 | red | Strain gauge1 |
| 3 | - | n.a. |
| 4 | yellow | Strain gauge 2 |
| 5 | yellow | Strain gauge 2 |
| 6 | - | n.a. |

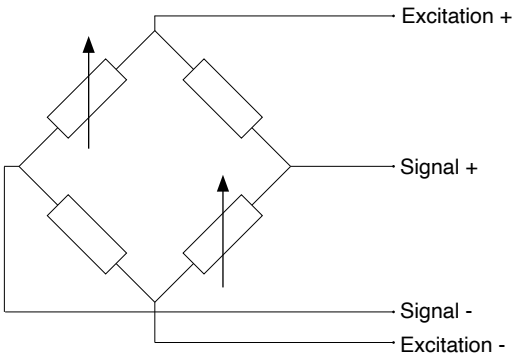
Option O: cable with open leads



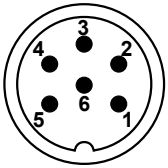

2x PVC screened cable (standard); 2 x 0.14 mm§; Ø 3.5mm

# Electrical Connection

**4/4 Bridge**




Option C: cable with connector




| Option C Connector Pin | Function |
|---|---|
| 1 | Excitation + |
| 2 | Excitation + |
| 3 | Excitation - |
| 4 | Signal + |
| 5 | Signal - |
| 6 | Excitation - |

## Assembly

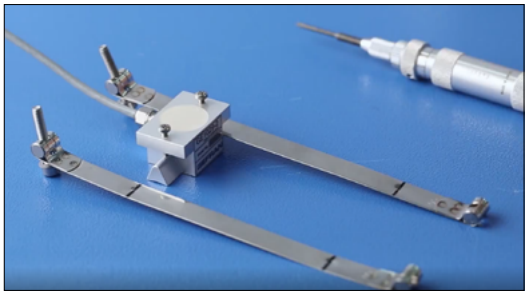
These sensors are precision instruments. The devices must be handled with the appropriate care. These instructions must be read and understood by every user.

### Preparation

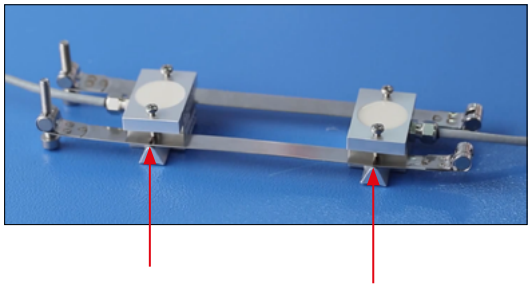
- Oil and other surface impurities as well as paint must be removed from the place of installation.
- The surface roughness of the place of installation has not to be rougher than N7.
- Check the foil of the sensor GE1029 for damage.
- The foil of the sensor GE1029 must be absolutely clean.

### Assembly procedure

1.
There are markings on the stainless steel bands.
(The distance between these markings depends on the diameter of the object to be measured)



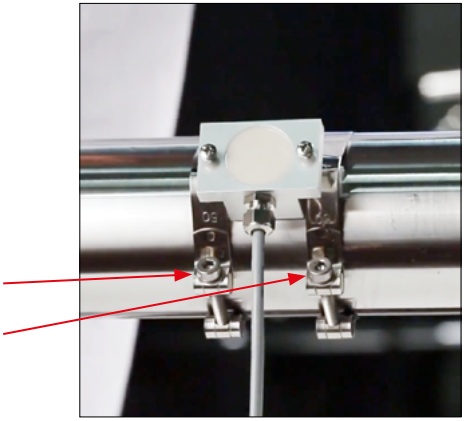
2.
The stainless steel strips are fixed at the marked position with the individual measuring modules.



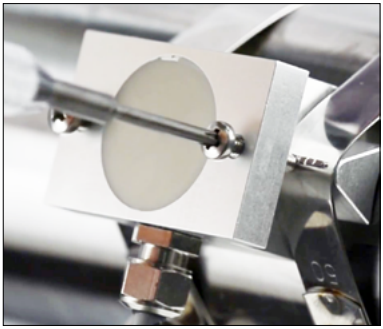
3.
Place the sensor around the object to be measured and screw it on carefully.

**Do not tighten with final torque yet!**

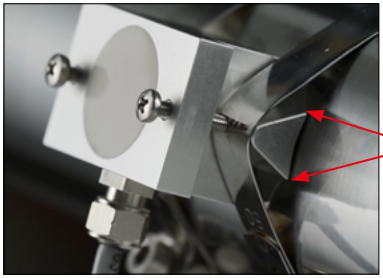
Cables must not be jammed.



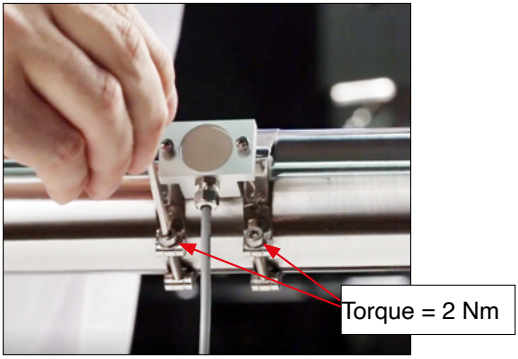
4.
Slightly loosen the fixing so that the individual measuring modules can rest perfectly on the circumference of the measuring object.



5.
The contact points must lie exactly in the axial direction on the surface to be measured.



6.
Screw the sensors hand-tight.
Torque = 2 Nm
The two measuring modules must be exactly opposite each other.




The system is now ready to measure.

**Attention:**
It is important that the screws are checked with the above torque after the machine has warmed up or after two days of operation at the latest.

## Maintenance

### Inspection

To prevent damage to the film, it should always be checked before using the sensor. Remove any impurities immediately.

### Maintenance

The sensor GE1029 should be checked every 12 months. For maintenance the sensor must be sent to Gefran Schweiz AG.

# DU1D

1- CHANNEL MONITOR


## Main features:

- Available for all Sensormate sensors (2/4 bridges)
- Direct display of the measured values in με, kN or t
- High accuracy and stable reset
- Automatic reset, external reset and alarm output
- Ideal for control cabinet installation (96x96mm, DIN 43700)
- Battery operation possible (optional) / not rechargeable

## Product description

The DU1D Monitor is an industrial signal amplifier and monitor for strain gauges and strain sensors. It has integrated functions for external and internal (automatic) reset. Force measurement on tie bars displays in kN or tons and diameter input. Strain measurement displays in με (micro strain). Direct switch units and change parameters. The handling is very user-friendly.

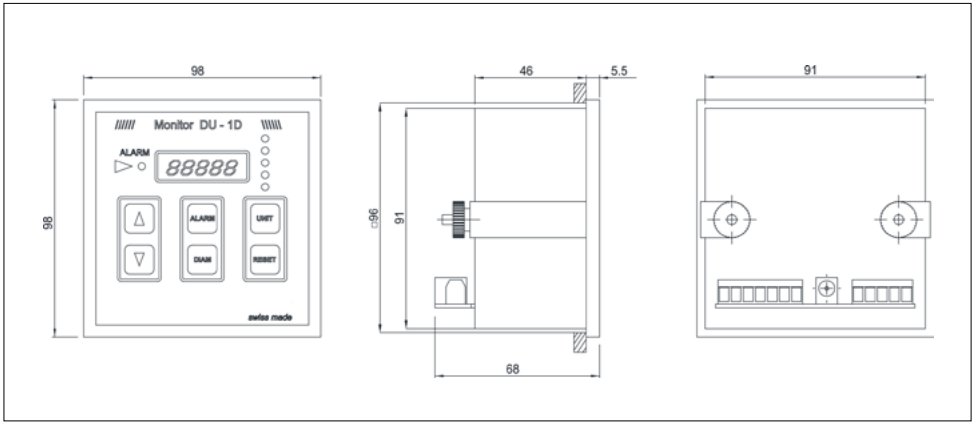
Application:
The device DU1D is used in conjunction with tie bar strain-sensors of the Gefran Schweiz AG for the control of the clamping force on presses, injection-moulding and die-casting machines. The ALARM relay allows to stop the machine in case of overload. Ideal to retrofit on existing machines.

## Technical Data

| | |
|---|---|
| Input bridge resistance | 350...1000Ω |
| Signal input range (FS) | 0,1...1mV/V |
| Resolution ADC | 16-Bit |
| Sampling rate | 500Hz |
| Output rate | 40Hz |
| Display refresh | 100Hz |
| Output signal | Display (± 9999 digit, 1 channel) |
| Noise | ≤ 1 digit |
| Accuracy | <± 0,05% FS |
| Accuracy of zero point | ≤ 1 digit |
| Linearity | <± 0,5% FS |
| Alarm reaction time | > 25ms |
| Reset time | > 200ms |
| Reset voltage | 15...28VDC |
| Supply voltage | 12VDC |
| Supply current | < 100mA |
| Inverse polarity protection | Yes |
| Accidental short-circuit protection | No |
| Operating temperatur range | 0...+65°C |
| Storage temperatur range | -40...+80°C |
| Temperatur coefficient at 10°C | < 0,1 (0,05 typical) |
| Protection class | IP50 |
| EMC | 2014/30/EU |
| Case material | Plastic |
| Weight | 210g |

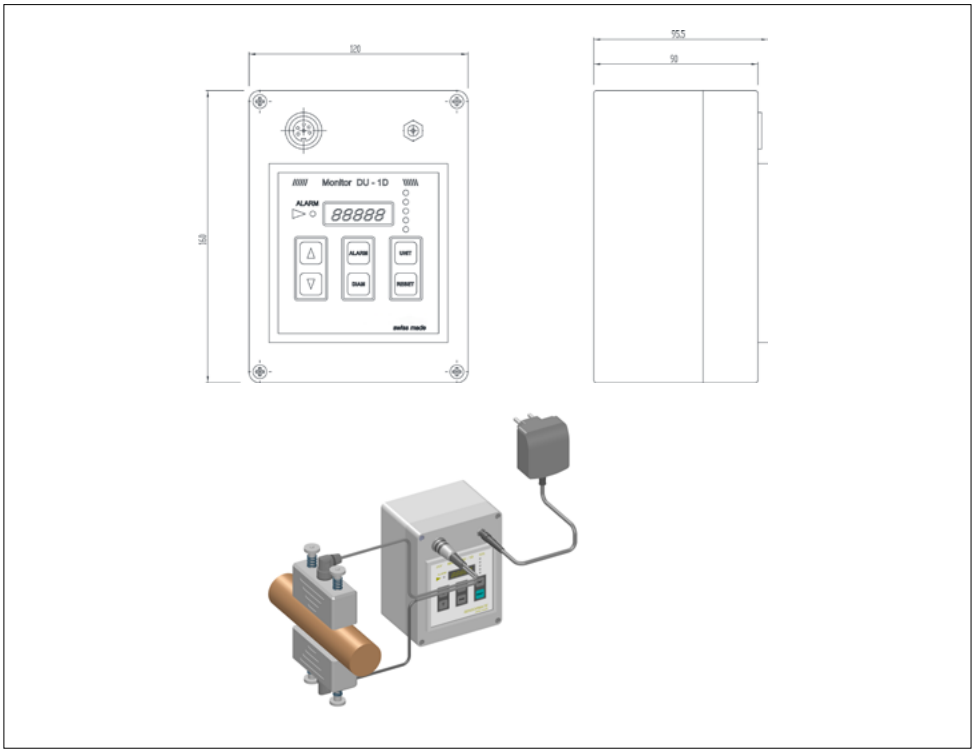
# Dimensions

Option: Installation-Housing




Dimensions in mm

Option: Box-Housing



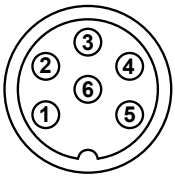

Dimensions in mm

# Mounting and installation

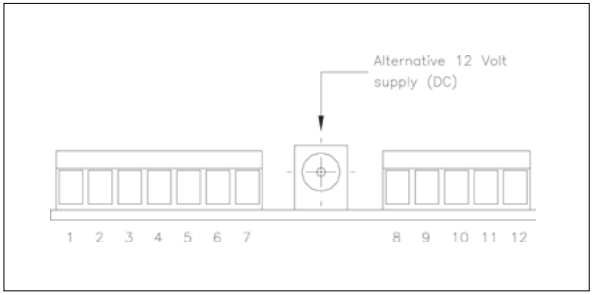
## Electrical connection

| Option:<br>Installation Housing<br><br>Connection pin | Function | Option:<br>Box-Housing<br><br>Connection M16 x 6-pin |
|---|---|---|
| 1 | Power supply 12VDC | alternative connection |
| 2 | GND | alternative connection |
| 3 | Reset + | - |
| 4 | Reset - | - |
| 5 | Alarm switch | - |
| 6 | Alarm switch open | - |
| 7 | Alarm switch closed | - |
| 8 | Strain gauge 1 | 1 |
| 9 | Strain gauge 1 | 2 |
| 10 | Shield | - |
| 11 | Strain gauge 2 | 4 |
| 12 | Strain gauge 2 | 5 |

## Option: Box-Housing




## Option: Installation Housing




# Operation and control

## Faceplate description


| | |
|---|---|
| △ | Decrease chosen value |
| ▽ | Increase chosen value |
| ALARM | Set alarm threshold |
| DIAM | Set tie-bar diameter |
| UNIT | Select unit (με, kN or tons) |
| RESET | Set measurement to zero |
| LED‘s | Indicate actual unit and/or mode |
| ALARM LED | LED on = alarm out active |

## Calibration

The monitor is factory calibrated to a cable length of 3m, 5m or 10m.

Attention:
The cable length influences the signal because the supplementary resistors and the cable enter the bridge.

Calibration cycle:
The DU1D monitor should be calibrated every 12 months. For calibration, the DU1D monitor must be sent to Gefran Schweiz AG. With the optionally available strain simulator, the calibration can be carried out at the customer level.

## Functions

### Unit

| | |
|---|---|
| **με**<br>(micro strain) | Displays the strain measured in με (1000μm/m) |
| **kN**<br>(kilo Newton) | Displays the load in kN (diameter must be set). |
| **tons** | Displays the load in tons. (diameter must be set) |
| **T.Force** | Displays the value in kN or tons, multiplied by 4<br>(diameter must be set) |
| **Custom** | Displays the value calibrated by the user. |

### Adjust diameter

For the force calculation in kN or tons the diameter of the cylindrical structure (column) must be set.
Press and hold the “DIAM” button, while adjusting the diameter with the “UP/DOWN” buttons. Then release the “DIAM” button. The diameter value is set now. Check the diameter setting any time by pressing the “DIAM” button.

**Alarm setting**

- Press and hold the „ALARM“ button and simultaneously set the alarm value with the „UP/DOWN“ buttons. Then release the „Alarm“ button.
  -> the alarm is activated.
  An alarm value = „0“ causes the alarm to be deactivated.
- Alarm values must be set separately for each unit.
- Alarm values for kN and tons are interdependent. This means that if the setting value is changed to kN, this automatically changes the setting value in tons, corresponding to the conversion „kN? tons“ and vice versa.
  -> the alarm values in T. Force are also dependent on it because they only have the kN-value or tone value quadruple.
- The custom alarm setting values „Custom-kN“ and „Custom-tons“ are also interdependent.

**Upper and lower limit value of the alarm**

The function for changing the operating mode of the alarm from UL to LL and vice versa is available as of software version 3.4.

| | |
|---|---|
| UL = | Upper limit value |
| LL = | Lower limit value |

**Setting the operating mode:**

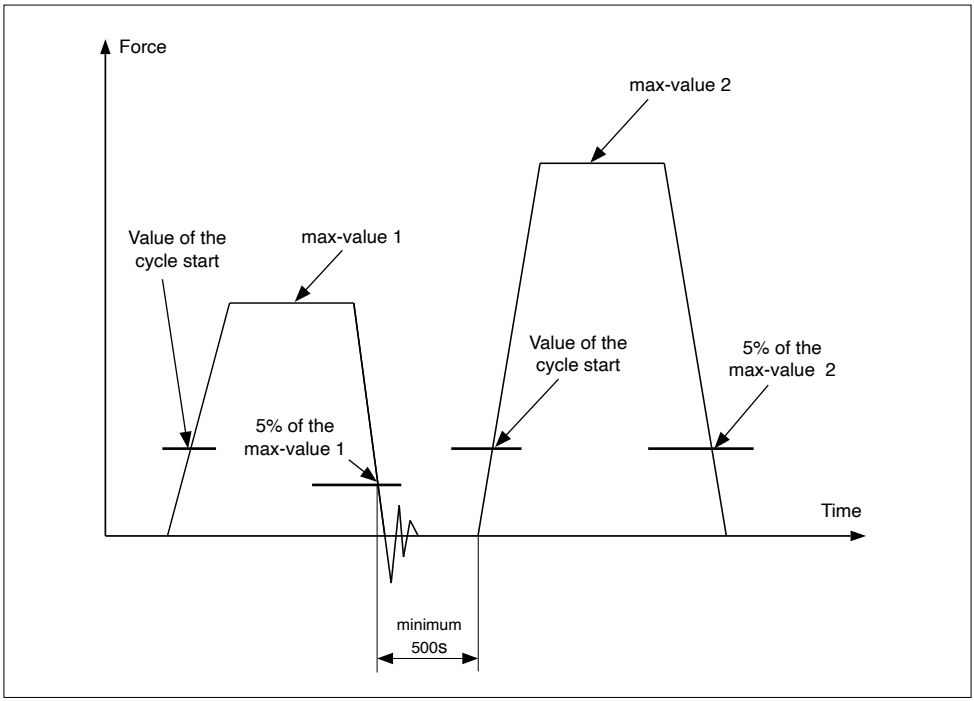
1. The DU1D must be switched off.
2. Press and hold the‘ ALARM‘ -button, then switch on the instrument during this time (respectively plug in the power supply). -> Release the alarm button.
3. One of the two displays appears:
   - UL active: 4 lines appear in the display at the top: ¯ ¯ ¯ ¯
   - LL active: 4 lines appear in the display at the bottom: _ _ _ _
4. Use the UP or DOWN buttons to select the operating mode.
5. Press the “RESET” button -> The operating mode is stored.

**Automatic reset**

The DU1D monitor is set to the maximum value of 1000$\mu\varepsilon$ at the factory. From a strain signal of 30$\mu\varepsilon$ (cycle start value), the monitor displays values.
As soon as the current value falls below 5% of the maximum value measured in the current cycle, the DU1D monitor carries out a reset (minimum 500ms). For correct measurements, the reset time (= time without load) must be at least 500ms.

| | |
|---|---|
| Measured value > value of the cycle start | -> Current value is displayed |
| Measured value < value of the cycle start | -> Display: '0000' |

| | |
|---|---|
| Value of the cycle start in "microStrain, kiloNewton or Tons": | 30µε |
| Value of the cycle start in „Custom mode": | 10% of the calibrated value |
| Minimum display value: | 30 Digit |




**Auto-Reset function ON/OFF:**

1. Press and hold UP/DOWN buttons together, press DIAM button and hold.
2. Keep pressing all 3 keys until in the display appears:
   -> "AutO" for Auto-Reset ON
   -> or "OFF" for Auto-Reset OFF

**Custom calibration**

Set customer-specific maximum value

1. 1. Select on the display “Custom-kN” or “Custom-t”.
2. 2. Press the UP and DOWN buttons simultaneously for 5 seconds.

   -> Display: “SErO”: 

3. The machine must be open, i. e. without load, -> then press the „RESET“ button.

   -> Display:”LOAd”: 

4. Now move the machine to full load, -> then press the „RESET“ button.

   -> Display:”Set”: 

5. Set the alarm value with the „UP“ and „DOWN“ buttons.
6. Press the „RESET“ button.
7. The custom calibration is set.

**Check software version**

1. The DU1D must be switched off.
2. Press the “UNIT” and “UP” button simultaneously.
3. Turn on the device while both buttons are still pressed.
4. The software version of the device is now displayed.

## Troubleshooting

Error messages

| | |
|---|---|
| **E01** | This message appears if no sensor is connected, or the offset value of the sensor is too large to display the 1000με. |
| **E02** | The measured value is greater than “9999” -> Display is not possible. |
| **E03** | The alarm value has been reached. The maximum measured value and “E03“ are displayed alternately. |
| **E04** | The device is not set to “Custom”. Switch to “Custom” and calibrate again. |
| **E99** | Incorrect calibration. Turn the unit off and on again. If the message still appears, call to the service of Gefran Schweiz AG. |

## Maintenance

Servicing

The DU1D monitor should be calibrated every 12 months. For calibration, the DU1D monitor must be sent to Gefran Schweiz AG. With the optionally available strain simulator, the calibration can be carried out at the customer level.

## Notes

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